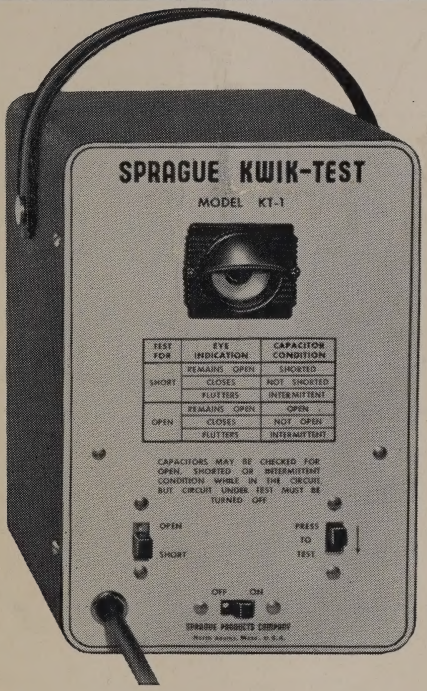
SPRAGUE

OPERATING MANUAL

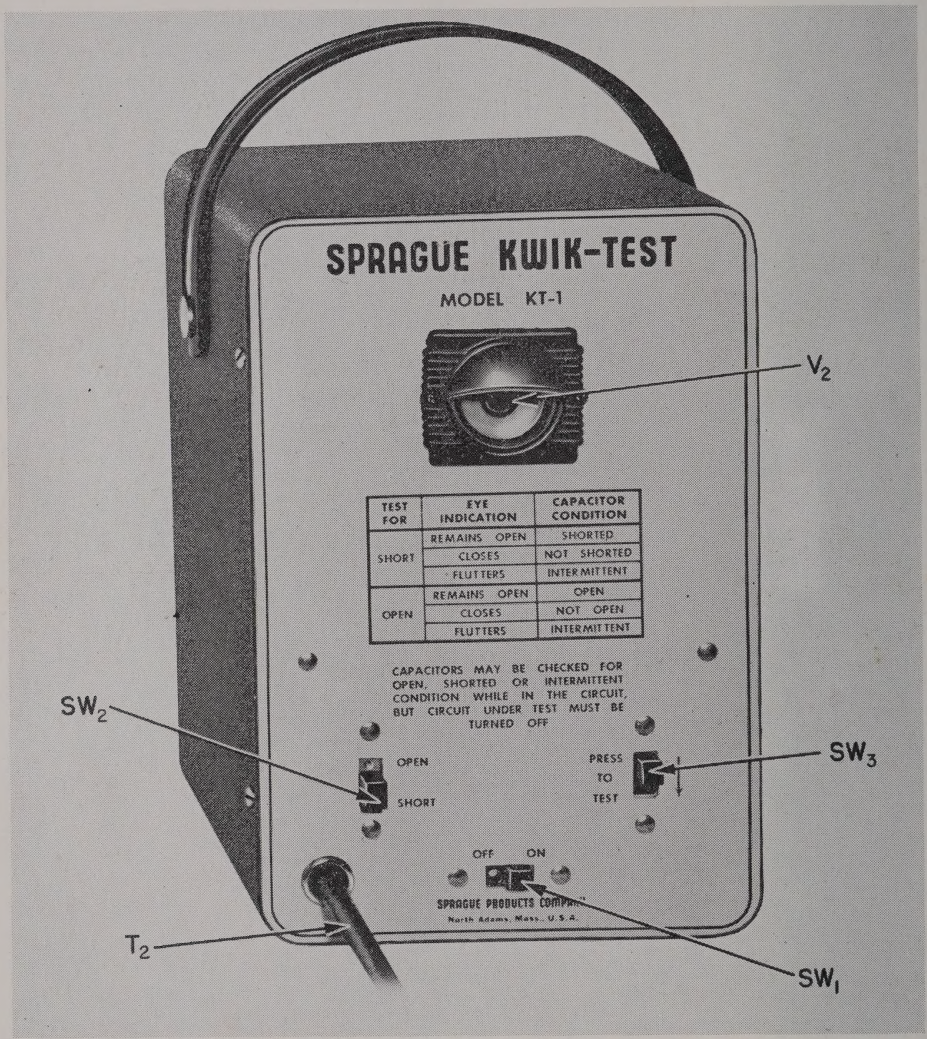


MODEL KT-1
KWIK-TEST

CAPACITOR CHECKER

SPRAGUE PRODUCTS COMPANY

North Adams, Mass.



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Operating Manual

MODEL KT-1 — KWIK-TEST

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1. General Description

1.1 Purpose and Usefulness: The Sprague Model KT-1 KWIK-TEST is designed specifically to meet the need of TV and Radio Service Engineers for an instrument that will quickly and easily indicate OPEN, SHORTED, or INTERMITTENT capacitors without removing them from their circuit. Any capacitor within the range of 30 $\mu\mu$f to 2,000 μf may be easily checked for these defects even though in parallel with a resistance as low as 60 ohms. Capacitors between .1 and 2,000 μf may be tested for SHORTS and intermittent shorts even though in parallel with a resistance as low as 2 ohms. Capacitors smaller than 30 $\mu\mu$f will indicate OPEN even though they are good, while those larger than 2,000 μf will indicate SHORT even though they are in good condition. Neither the OPEN or SHORT test will give correct results if the capacitor is in a parallel resonant circuit tuned to a frequency higher than 10 mc. While the capacitor may be tested without removing it from its circuit, the circuit under test MUST be turned OFF. If it becomes necessary to determine the actual capacitance, along with insulation resistance (of paper, mica or ceramic capacitors), or power factor and leakage current of electrolytic capacitors, then a bridge such as the SPRAGUE TEL-OHMIKE MODEL TO-4 is needed.

1.2 LINE VOLTAGE and FREQUENCY: The KT-1 is designed for use only on a 115 V. 50-60 cycle AC line. Model KT-1X is available for use on 115/230 V. 25-60 cycles.

1.3 DC OPERATION: Under NO circumstances should a KT-1 or KT-1X be plugged into a DC Outlet. *ALWAYS* use an inverter power supply (either vibrator or rotary type) that will supply the needed 25 watts of a-c power.

1.4 PHYSICAL APPEARANCE: The medium gray wrinkle finish steel case, with plastic handle, and the light gray panel with clear black markings make the KT-1 an instrument that attracts favorable attention, and commands respect on any service bench. The overall size of the KT-1 is 9″ high x 6″ wide by 5-1/4″ deep.

1.5 The net weight of the KT-1 is 6 lbs.

1.6 TUBE COMPLEMENT: Two (2) type 1626 and one (1) 1629 are used in the KT-1.

1.7 COMPONENTS: The components used in the KT-1 were engineered for long, dependable service. Molded Sprague Telecap® paper capacitors are used wherever practical. The fixed capacitors in the $\mu\mu$f range are Sprague Cera-Mites, while the trimmers are of the silver-ceramic type. The power transformer and RF oscillator coil are treated to resist the effects of moisture. The wire wound resistor used in the SHORT test is a famous Sprague Koolohm®. Metal parts are suitably treated to resist corrosion.

2. Short Test

2.1 Fig. 1 shows the basic circuit of the SHORT test which operates as follows: If the test clips are shorted, the voltage at the grid of the "eye" tube is zero (maximum opening). If the clips are open, the entire voltage appears at the grid of the "eye" tube, which causes it to close. Thus a shorted capacitor will cause the "eye" to remain open, while a normal capacitor will cause it to close either partially or completely depending upon its reactance, and the circuit in parallel with it.

2.2 OPERATING PROCEDURE:

1. Set the line switch, in the lower center of the panel, in the ON position.
2. Place the Test Selector switch in the lower left portion of the panel in the SHORT position.
3. Connect the test clips to the terminals of the capacitor to be tested.
4. Press the PRESS-TO-TEST switch, in the lower right portion of the panel, down and watch the action of the "eye" tube.
5. If the "eye" remains completely open (no change of shadow angle as the switch is pressed) the capacitor is shorted and should be replaced.
6. If the "eye" closes (even slightly in the case of large capacitors in parallel with small values of resistance), the capacitor is not shorted, and should be given the OPEN test.
7. Tap the capacitor sharply. If the "eye" flutters, the capacitor is intermittent, and should be replaced.

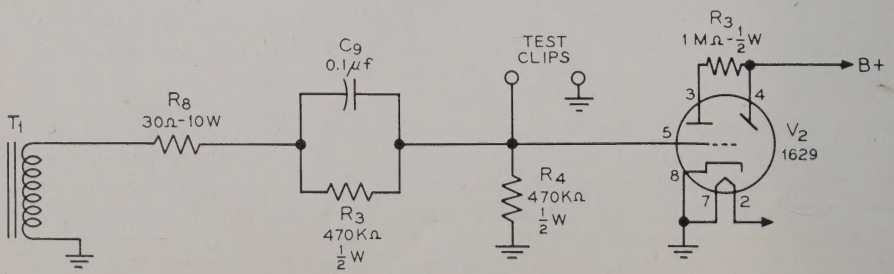


Figure 1 — "Short Test" Circuit

3. Open Test

3.1 Fig. 2 shows the basic circuit of the OPEN test which operates as follows: Test cable T_2 and impedance Z_1 constitute a quarter wave transmission line operating at a frequency of approximately 20 mc. A useful property of a quarter wave line is utilized in this test namely that the impedance connected to the output end of the line is reflected to the sending end as a reciprocal, i.e., if the output is shorted the input end "sees" an open circuit. In operation if the test clips are open (or are connected to an open capacitor), the sending end (coupling coil L_2) "sees" a short circuit (zero voltage), which causes the "eye" to remain open. Any capacitance connected to the clips results in a voltage across L_2 (which is rectified by the 1N51), and then impressed upon the grid of the "eye". This d-c voltage causes the "eye" to close in proportion to its magnitude. A small capacitor causes a small closure, while a large capacitor causes the "eye" to close completely.

3.2 OPERATING PROCEDURE:

1. Connect test clips to the terminals of the capacitor under test.
2. Place the Test Selector switch in the OPEN position.
3. Press the PRESS-TO-TEST switch, and watch "eye" tube.
4. If the "eye" remains completely open (no change of shadow angle as the switch is pressed), the capacitor is open.
5. If the "eye" closes (even slightly in the case of small capacitors – the capacitor must be larger than 200 $\mu\mu$f to completely close the "eye") the capacitor is not open. Note: If when testing electrolytic or other metal cased capacitors a small closure is noted, this indication is due to internal lead and terminal capacitance and should be disregarded. Thus large capacitors which show only a small closure are open and should be replaced.
6. Tap the capacitor sharply. If the "eye" flutters, the capacitor is intermittent.

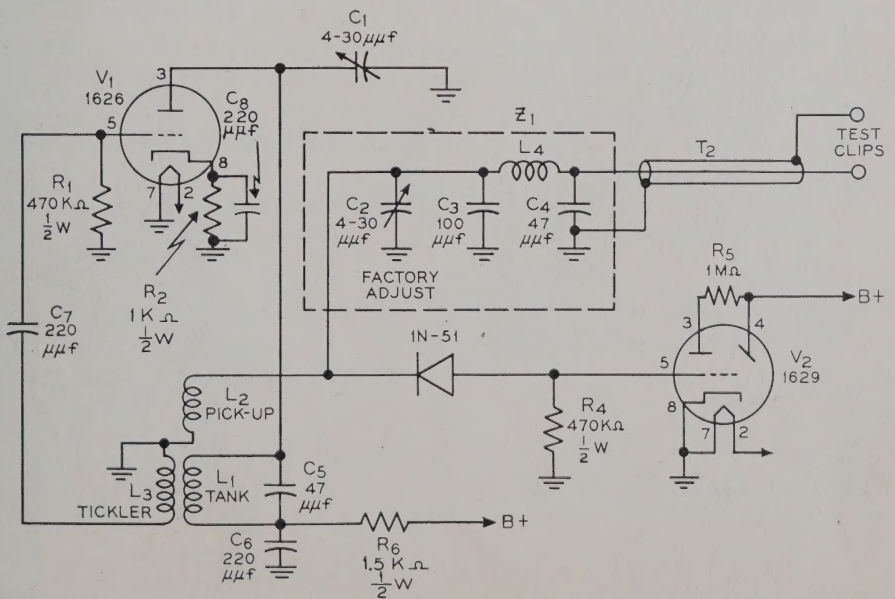


Figure 2 — "Open Test" Circuit

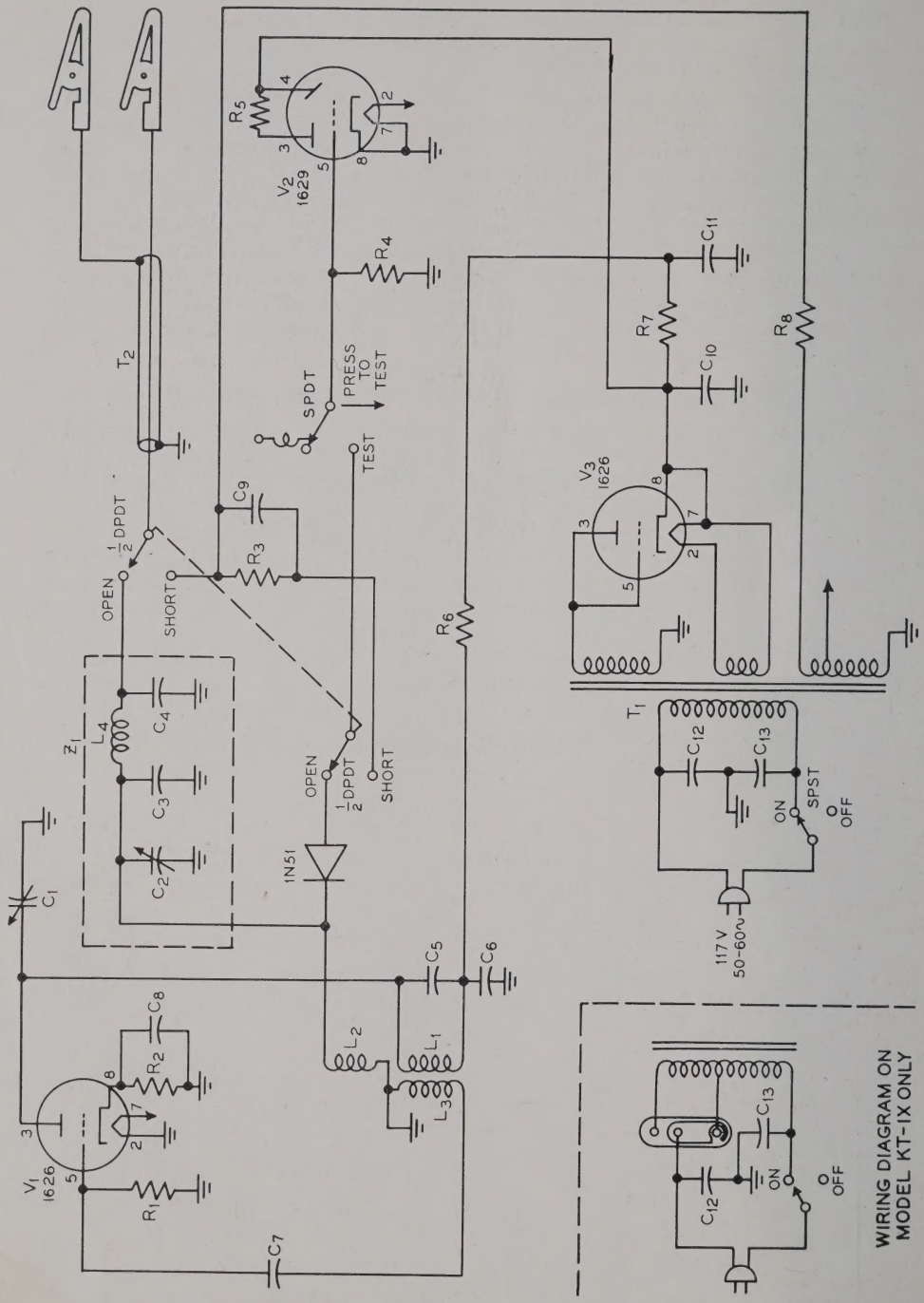


Figure 5 — Complete Circuit Diagram

4. Readjustment

4.1 Although the oscillator and the artificial line of the OPEN TEST of the KT-1 have been designed for long-time stability, under certain conditions of temperature and humidity readjustment may be necessary. This may be determined easily and, if needed, can be quickly made.

4.2 To test the operation of the OPEN TEST, set the Test Selector to the OPEN position and Press the PRESS-TO-TEST switch down, with the test clips not connected to any capacitor, and watch the action of the "eye". There should be no change of shadow angle as the PRESS-TO-TEST switch is operated. If there is any change, remove the plug button from the rear of the case and very slowly adjust the trimmer capacitor, C_1, which is now accessible, at the same time operating the PRESS-TO-TEST switch and watching the "eye". The trimmer is correctly adjusted when the operation of the switch produces no change of shadow angle of the "eye". This is the only adjustment of the instrument that is required. Do not try to adjust unless the unit is thoroughly warmed up for at least 30 minutes.

5. Miscellaneous Hints

5.1 DO NOT ALTER the length of the test lead under any conditions since it is a part of the quarter-wave line as explained in 3.1. Should the insulated test clip break off, it should be resoldered without making any large change in the length of the cable. If this is done, the instrument should be checked as directed in 4.2.

5.2 Return your KT-1 Registration Card within five (5) days of the date of purchase in order to obtain the benefits of the Sprague warranty.

5.3 Always give model and serial number of your instrument when corresponding regarding it. The serial number is located on the rear of the chassis below the line cord.

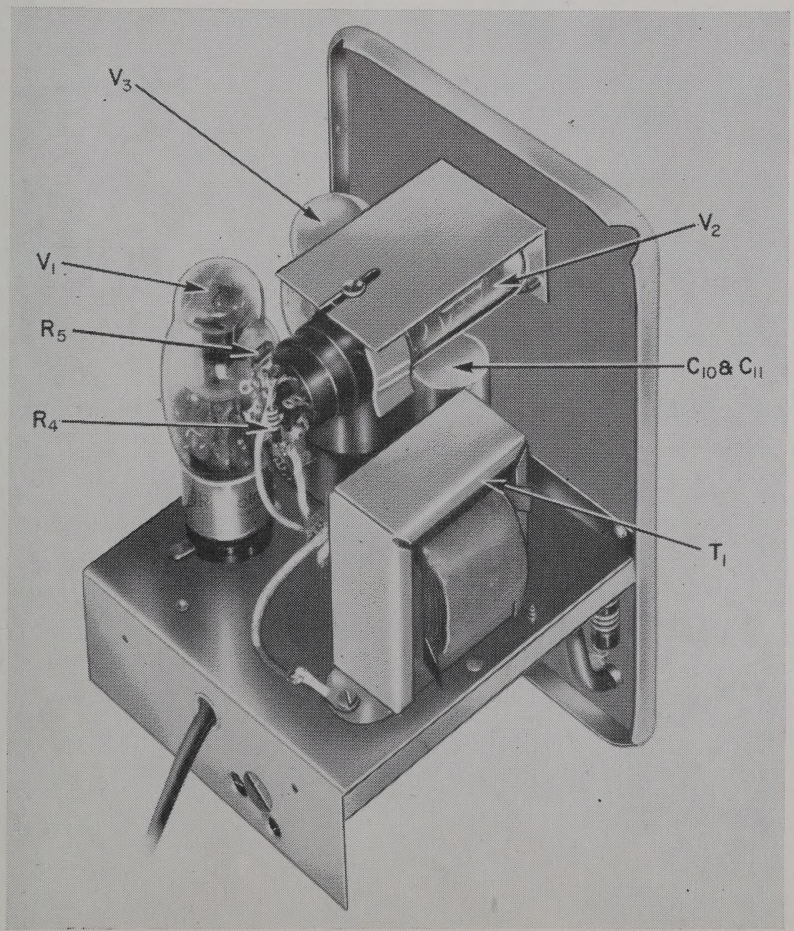
5.4 If it should ever be necessary to return your KT-1 for service, write giving complete details of the difficulty you are having, and detailed instructions and labels will be furnished for shipping the instrument to your nearest authorized service depot. This procedure will save you time and money.

LIST OF MAINTENANCE PARTS

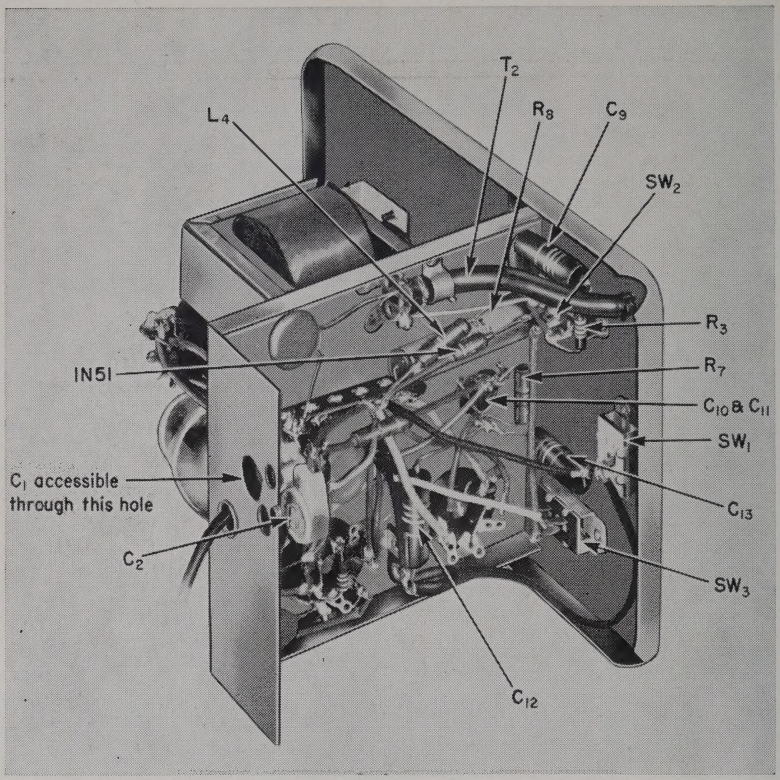
Circuit Symbol	Replacement Part No.	Description
L_1, L_2, L_3	3-312	Coil, oscillator, 20 mc.
L_4	3-313	Coil, loading, artificial quarter wave line.
R_1, R_3, R_4	2-113-10	Resistor, fixed, composition, 470K ohms, ±10%, ½ watt.
R_2	2-49-10	Resistor, fixed composition, 1000 ohms, ±10%, ½ watt.
R_5	2-121-20	Resistor, fixed, composition, 1 Meg. ±20%, ½ watt.
R_6, R_7	2-302-20	Resistor, fixed, composition, 1500 ohms, ±20%, 1 watt.
R_8	2-761	Resistor, fixed, wire wound, 30 ohms, ±5%, 10 watt, Sprague Koolohm, Type 10KT.
T_1	3-94	Transformer, filament, power & short test for KT-1.
T_1	3-94-X	Transformer, filament, power & short test for KT-1X.
C_1, C_2	1-1001	Capacitor, adjustable dual trimmer, silver ceramic 4-30 μμf.
C_3	1-842	Capacitor, fixed, ceramic dielectric 100 μμf. ±10%, 500 V., SL.
C_4	1-841	Capacitor, fixed, ceramic dielectric 47 μμf. ±10%, 500 V., SL.
C_5	1-840	Capacitor, fixed, ceramic dielectric 47 μμf. ±10%, 500 V., N750.
C_6, C_7, C_8	1-843	Capacitor, fixed, ceramic dielectric 220 μμf. ±20%, 500 V., SL.
C_9	1-105	Capacitor, fixed, molded paper – dielectric .1 μf. ±20%, 200 V., Sprague 67P10402.
C_{10}, C_{11}	1-518	Capacitor, fixed, dry electrolytic 10 + 10 μf. 300 WVDC, Sprague Type TVL.

LIST OF MAINTENANCE PARTS — Cont.

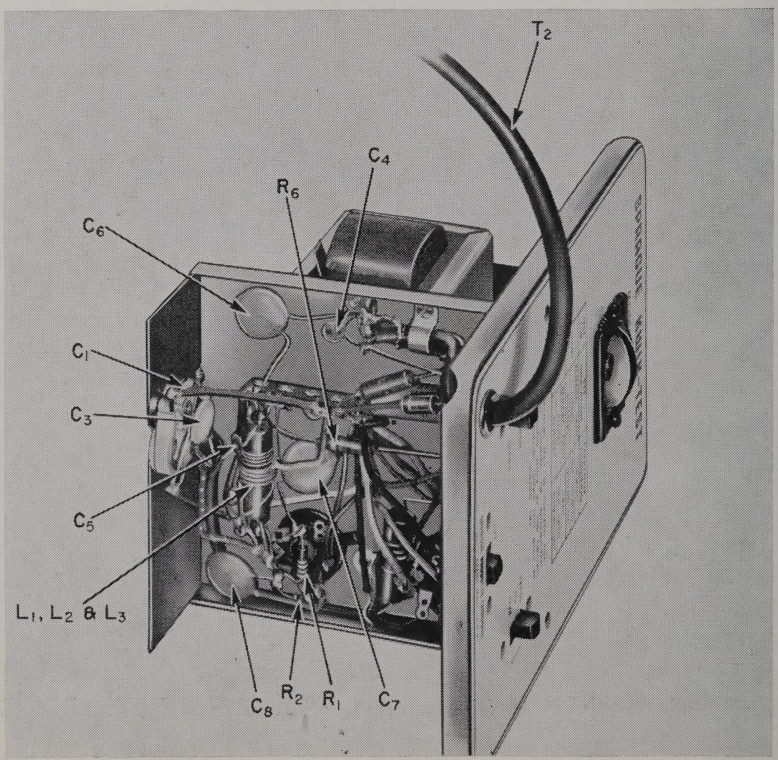
Circuit Symbol	Replacement Part No.	Description
C_{12}, C_{13}	1-830	Capacitor, fixed, molded paper-dielectric .018 μf. ±10%, 400 V. Sprague 67P18394.
T_2	6-25	Cable, test probe, RG-54/U, 48" long, complete with clips and ground lead
V_1, V_3	5-1626	Tube, electron, type 1626
V_2	5-1629	Tube, electron, type 1629
	5-1N51	Rectifier, crystal type 1N51
SW_1	11-76	Switch, slide, SPST
SW_2	11-82	Switch, slide, DPDT
SW_3	11-80S	Switch, slide, spring return, SPDT



View from Right Rear



View Under Chassis Looking Forward



View Under Chassis Looking Toward Rear

STANDARD MODEL KT-1

WARRANTY

The Sprague Products Company warrants each Kwik-Test to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to us intact, for our examination, with all transportation charges prepaid to our factory or authorized service station within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This Warranty does not extend to any Kwik-Test which has been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory nor to cases where the serial number thereof has been removed, defaced or changed.

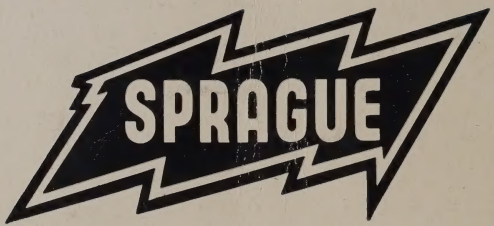
Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by us without charge to the owner.

This Warranty is in lieu of all other Warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our products.

If the return of this instrument is deemed necessary, advise SPRAGUE PRODUCTS COMPANY, NORTH ADAMS, MASS., giving full details. Our reply and complete shipping instructions will reach you within five (5) days after receipt of your letter. NO ADJUSTMENTS WILL BE MADE UNLESS OUR CONSENT FOR THE RETURN OF THE INSTRUMENT IS OBTAINED BEFORE MAKING SHIPMENT.

NOTE: RETURNED INSTRUMENTS MUST BE PACKED CAREFULLY, MARKED FRAGILE, AND SHIPPED BY PREPAID EXPRESS.

SPRAGUE PRODUCTS COMPANY
North Adams, Mass.



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For Dependability

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